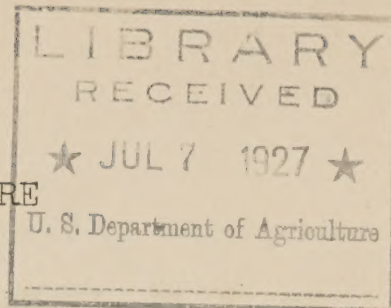


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UNITED STATES DEPARTMENT OF AGRICULTURE
Director of Regulatory Work
Washington, D. C.



April 27, 1926.

CONFIDENTIAL.

MINUTES OF CONFERENCE BETWEEN REPRESENTATIVES OF THE DEPARTMENT OF AGRICULTURE, THE INSECTICIDE AND FRUIT INDUSTRIES AND OTHERS, RELATIVE TO ARSENICAL SPRAY RESIDUES ON FRUITS.

The conference was called to order at 10:15 A.M., Monday, April 12, 1926 by Mr. W. G. Campbell, Director of Regulatory Work, U. S. Department of Agriculture, presiding as Chairman. The following were present:

- Mr. W. G. Campbell, Director of Regulatory Work.
- Dr. P. B. Dunbar, Assistant Chief, Bureau of Chemistry.
- Dr. W. A. Taylor, Chief, Bureau of Plant Industry.
- Dr. A. L. Quaintance, Associate Chief, Bureau of Entomology.
- Dr. L. C. Corbett, Horticulturist, Bureau of Plant Industry.
- Dr. J. K. Haywood, Chairman, Insecticide & Fungicide Board.
- Dr. Chas. Brooks, Senior Pathologist, Bureau of Plant Industry.
- Dr. C. C. McDonnell, Senior Chemist in charge of Insecticide & Fungicide Laboratory.
- Mr. J. E. Graf, Senior Entomologist in charge Truck Crop Insect Investigations, Bureau of Entomology.
- Dr. M. B. Waite, Senior Pathologist, Bureau of Plant Industry.
- Mr. Wells A. Sherman, Chief Marketing Specialist, Bureau of Agricultural Economics.
- Mr. F. G. Robb, Specialist in Fruit and Vegetable Inspection, Bureau of Agricultural Economics.
- Mr. C. W. Crawford, Chemist, Bureau of Chemistry.
- Mr. F. C. Meier, Plant Pathologist, Extension Service.
- Mr. L. B. Smith, Japanese Beetle Project, Bureau of Entomology, Riverton, N. J.
- Dr. T. J. Headlee, New Jersey State Entomologist.
- Prof. W. J. Schoene, Virginia State Entomologist.
- Mr. R. G. Phillips, Secretary, International Apple Shippers Association.
- Mr. Carroll Rodgers, Representing Watsonville Packers and Shippers, and Growers in California generally.
- Mr. Victor C. Follenius, Representing Hood River Apple Growers Association and Oregon as a whole.
- Mr. J. Walter Herbert, Representing Yakima Fruit Growers Association and Washington generally.
- Mr. O. T. Clawson, Representing Wenatchee District and Washington generally.
- Mr. W. S. Campfield, Secretary, Virginia State Horticultural Society.

Mr. E. W. J. Hearty, Chairman, Foreign Trade Committee, International Apple Shippers Association, New York City.

Mr. Wayne M. French, Chairman, Atlantic Division, Foreign Trade Committee International Apple Shippers Association, New York City.

Mr. W. L. Minick, Vice President, International Apple Shippers Association, Waynesboro, Penna.

Mr. Carpenter, American Fruit Growers, Hancock, Md.

Mr. Frasier, International Apple Shippers Association.

Mr. A. H. McIntyre, Skinner Grading and Wiping Machine Co., Williamson, New York.

Mr. F. L. Lupton, Bean Spray Pump Company, Winchester, Va.

Mr. Ernest Hart, Niagara Sprayer Company, Middleport, N. Y.

Mr. W. M. Dickson, General Chemical Company, New York City.

Mr. L. E. Tisdale, General Chemical Company, New York City, also representing Agricultural Insecticide & Fungicide Manufacturers' Association.

Mr. A. H. Kent, Grasselli Chemical Co., Cleveland, Ohio, representing also the Agricultural Insecticide and Fungicide Manufacturers' Association.

Mr. H. E. Woodworth, California Spray Chemical Company, New York City.

Dr. O. F. Hedenberg, Toledo Rex Spray Company, Toledo, Ohio.

Mr. A. E. Waller, Ansbacher Insecticide Company, New York City.

Mr. A. J. Gunderson, Sherwin-Williams Company, Cleveland, Ohio.

Mr. Arthur S. Somers, Fred L. Lavanburg & Company, New York City, also Agricultural Insecticide & Fungicide Manufacturers' Association.

Mr. Wm. O. Tuck, Jr., Corona Chemical Company, Milwaukee, Wis.

Mr. R. N. Chipman, Chipman Chemical Engineering Company, Bound Brook, N. J.

Mr. Vreeland, Lucas-Kiltone Company, Philadelphia, Pa., also Agricultural Insecticide & Fungicide Manufacturers' Association.

Dow Chemical Company, Midland, Mich.

Bowker Chemical Company, New York City.

Mr. Hawkins, International Harvester Company, Chicago, Ill.

Mr. Campbell opened the conference with the following statement :

The Department and the fruit growing industry, particularly the apple growers, are confronted with a very grave situation. This year in a greater degree than ever before we have had manifestations of the objectionable character of fruit carrying excessive spray residues. Such instances as have occurred in the past were confined entirely to this country. When these complaints first occurred several years ago, the Department endeavored to determine upon some plan to correct what were considered to be abuses and to do so without impairing the industry if possible.

Alleged arsenical poisoning outbreaks which occurred in England this year and were ascribed to American apples excessively sprayed with lead arsenate sprays have resulted in considerable publicity abroad and inevitably in a material impairment of the foreign market. An official representative of the Ministry of Health came to this country and was in session for an extended time with representatives of the Department of Agriculture to determine just what the condition was in America and to determine on the basis of the knowledge acquired in such conference, just what the British authorities themselves would do.

Our purpose today is to work with you or rather to enlist your services in cooperation with the Department to undertake by an exercise of ample precautionary measures the prevention of the difficulties which we have experienced and which if not modified in the way of improved spray practice, will manifest themselves in exaggerated form in years to come. In this department the Bureau of Entomology, Bureau of Plant Industry and Bureau of Agricultural Economics are concerned, and especially the Bureau of Chemistry through its obligation to enforce the "Food and Drugs Act." The Public Health Service has been called upon to consider what constitutes excessive quantities of arsenic. Many instances were detected of arsenic on fruit in excess of what is believed to be a safe tolerance by the Public Health Service. These shipments were removed from the market without much publicity. It is the purpose of the Department also to carry on our deliberations and the formulation of our plans without publicity. This is not a case in which publicity may be expected to operate in the interest of public welfare. All of the apples on the market now permitted sale without restriction are apples that are unobjectionable. Large quantities of apples are either embargoed as the result of legal action that has been taken or are held subject to inspection and examination through arrangements made in cooperation with the trade. No advantage of which I could conceive would follow publicity; hysteria undoubtedly would develop. Arsenic represents in the popular conception about the most virulent of poisons, and if the public erroneously thought that there were quantities of arsenic on all fruit, unquestionably there would be a demoralization of the apple market.

I touch upon this to justify the statement that I made in the telegram inviting you to come here, requesting you to treat this matter in a confidential way and in asking you after we shall have fin-

ished our deliberations, that you continue to treat it in the same way. I can see no advantage to be derived from publicity and, on the other hand, I can see a great deal of damage.

In the forthcoming year we should carry a warning to the apple growers and do that as emphatically as we can. We have done some work of that sort in the past five or six years. We did not do much of it the past spring. It had been our hope from the results that we seemed to have secured from our educational efforts in previous seasons, with all the producers of apples sufficiently well acquainted with those developments that would result from excessive or careless spraying, that it was unnecessary to bring to their attention any further the need of observing scrupulously the utmost care in spraying operations.

Whether excessive sprays on apples this season is due to failure on our part to warn producers in the spring of 1925 as extensively as we had in previous years, or whether the excessive quantities of spray residue are due to other conditions, the fact remains that if the market for American apples not only in this country but abroad is to be preserved, it is imperative that American apples be put out next year with considerably greater freedom from quantities of arsenic than was the case this year. That conclusion, it seems to us, is indisputable, and staring us squarely in the face; it becomes the duty of the Department, of every agency interested and dependent in any way whatever upon the American apple crop, to devote itself with all seriousness to the determination of the most effective manner in which this can be brought about; our own forces, State agencies, the Extension Service, Experiment Stations, State Universities, State officials generally, and particularly the trade -- the interest represented by you should be enlisted in an effort to convince the producers that proper spray schedules must be observed and carelessness must be overcome. Everybody, including shipping organizations, commission men, manufacturers of insecticides and all will serve effectively in the achievement of this end. When the pest becomes very abundant and destructive it will be the tendency of the grower to use sprays in a more concentrated form and perhaps more frequently.

At this point I am going to ask Senator Jones, who is manifestly interested, and because of his presence at the first conference that was called by the Bureau of Chemistry following the action of the State officials of Boston when a shipment of pears from California was embargoed, if he will not say a word to the conference.

Senator Jones of Washington emphasized the importance of dealing with this situation in a very careful and quiet way and stated that the State of Washington, being probably the largest producer of apples in the Union, was vitally interested in the apple market and the proper handling of the situation, since anything that injuriously affects the apple market will very greatly affect his people. He therefore stressed the desirability of the cooperation of insecticide men and others with the Department in order to take care of this rapidly growing apple industry.

Dr. P. B. Dunbar, Assistant Chief of the Bureau of Chemistry in charge of regulatory work, explained at some length the situation in that Bureau in connection with the enforcement of the Pure Food and Drugs Act in the case of commodities bearing deleterious amounts of arsenic and called attention to the fact that in a given quantity of arsenic trioxide, there was twice as much lead, both seriously toxic agents, and regarded by the medical profession as cumulative poisons. Dr. Dunbar reviewed the spray residue situation on fruit during the past several years from the standpoint of the Food and Drugs Act and stated that on different occasions, meetings had been held with interested parties in Washington and elsewhere, all however in a way to avoid any publicity, but designed to correct the practice of marketing objectionable fruits. He cited the active and prompt cooperation of officials of the State of California in obviating further objection from the spray residue standpoint on pears. During the seasons 1924-25 not a great deal of educational work had been done, since it was believed that earlier efforts along this line had produced the desired results. The situation in connection with the 1925-26 apple crop was however especially disappointing and indicates the need of constant educational work among growers as to the relation of the Pure Food and Drugs Act to spraying operations.

Dr. Dunbar stated that British representatives had come to Washington and discussed the situation, especially the limit of arsenic which they regarded tentatively as permissible, based on investigations made some 25 years ago in connection with arsenic poisoning traced to beer and known as the Birmingham Beer Poisoning Cases. It was stated that British authorities did not wish to close the market for American apples, but in defense of public health must insist that something be done to prevent shipments of objectionable apples to England. Sir George Buchanan at the time of his visit here was of the opinion that no further thought was given by the British to complete embargo on American apples. On the other hand, it was expected that the American government would see to it that export apples should be sufficiently free from arsenic to render them safe. Dr. Dunbar dwelt on the efforts of the Bureau of Chemistry to cooperate with apple shippers in connection with the recent embargo at Winchester, Va., and stated that the Bureau was going to unusual pains to assist them in their present dilemma.

The Director of Foods and Drugs of the State of Pennsylvania, while unable to be in attendance at the conference, indicated his great interest in the purpose of the meeting and that under the laws of Pennsylvania it would be necessary for the State to take formal legal action against any excessively sprayed fruit.

Dr. A. L. Quaintance, Associate Chief of the Bureau of Entomology, stated that the logical place to correct improper spray practice was of course in the orchards; that undoubtedly some orchardists failed to appreciate the seriousness of spraying apples so late in the summer that arsenical spray residues on the harvested fruit would result. It was pointed out that in many apple growing regions the season of 1925 was an unusually favorable one for the codling moth, and that much damage from this insect to apples had resulted. When the fruit growers saw the excessive amount of codling moth injury during

the late summer and fall, they rather naturally attempted to prevent this by additional sprayings. Dr. Quaintance emphasized the fact that the best way to prevent late injury from the codling moth was to concentrate the attack against the first brood. The importance of thorough calyx spraying was indicated, and it was stated that there should be from 2 to 3 first brood cover sprays according to region. Necessary facts in the life history of the codling moth were discussed and illustrated by means of a chart as a basis for the control recommendations made. It was pointed out that there were other very important means of reducing the codling moth in addition to spraying, such as packing house sanitation, including the adoption of methods to prevent the escape of moths from packing houses and sheds to re-infest the orchards in the spring; and the use of bands placed around the trunk and limbs of trees as a means of furnishing pupation quarters for the larvae and from which they could be readily collected and destroyed. A codling moth control program, involving thorough spraying against the first brood, packing house sanitation and the use of bands, it was stated would, in his judgment so greatly improve the codling moth situation in orchards, even during years of abnormal abundance of the insect, that the spray residue problem would soon cease to be of any importance (General recommendations for codling moth control will be found in the appendix.)

Dr. T. J. Headlee, State Entomologist of New Jersey, discussed codling moth spraying operations in that State. He stated that he was urging their growers to provide a good power outfit for each 30 acres of orchard as compared with the present average equipment of one power sprayer to each 50 acres of orchard in the State. Dr. Headlee discussed the merits of the so-called "one spray" method from the standpoint of his experience.

In discussing Dr. Headlee's remarks, Dr. Quaintance thought there should be a power sprayer for perhaps each 15 to 20 acres of orchard, varying according to size of trees to insure the work being done with great thoroughness and at proper times. He also felt that orchardists as a rule did not use sufficient spray liquid for the calyx application.

Dr. W. A. Taylor, and Dr. Chas. Brooks, of the Bureau of Plant Industry, discussed spray residues from the fungicidal standpoint. Dr. Brooks stated that he visited several different states in the northwest during the fall of 1925 and had opportunity to become familiar with the codling moth situation. He noted in the case of some orchards where very thorough first brood spraying had been done that infestation by the insect had been practically eliminated and late sprayings were not required. While growers in some sections of the East spray late for bitter rot and blotch, and arsenicals are usually added, he had not heard of complaints as to excessive residue in these cases.

Dr. R. H. Phillips, Secretary of the International Apple Shippers Association, explained at some length the world-wide interest of his association in all matters pertaining to apple production and marketing. He stated that we have exported nearly 5,000,000 boxes of apples, a little over 2,800,000 barrels to all ports, and while the spray residue situation is particularly acute in the United Kingdom, it could not be expected that it would definitely be limited to that particular section but would spread to continental Europe and elsewhere. Referring to the situation in the Pacific Northwest, he stated that the annual value of the apple crop in the State of Washington is between \$45,000,000 to \$50,000,000; in Oregon around \$6,000,000 and in Idaho perhaps from \$6,000,000 to \$10,000,000, illustrating the tremendous values at stake in this matter. Mr. Phillips emphasized that while no embargo by England will be placed on the 1925-26 crop, that next year their regulations so far as arsenical residue is concerned must be carefully observed. He noted that the loss already this year on export fruit amounted to about \$1,000,000. He stated that apples from Australia and Canada are to be accorded the same treatment as American apples. He urged that all agencies interested in the spray residue situation exercise the greatest caution in the matter of publicity. He felt that no good would come from alarming the apple consuming public, since Federal, State and Trade agencies were actively engaged in correcting the trouble.

Mr. Lloyd Tenny, Assistant Chief of the Bureau of Agricultural Economics, explained to the conference what that Bureau could do in the present emergency. He agreed that the correction of the difficulty was in the hands of the orchardists, and felt that much educational work should be done by Federal, State and other agencies to insure their understanding of the danger of late spraying. He also felt that if thorough early spraying was accomplished, the necessity for late and objectionable arsenical treatments would be unnecessary. Mr. Tenny promised the aid of the Bureau's inspection force, involving direct, cooperative or licensed employees of the Department in securing more careful spraying by orchardists. Mr. Tenny further explained that in connection with the Bureau's Fruit Inspection work, there was a cooperative agreement with State Departments of many States, including all of the apple-producing States, with the exception of Michigan. He felt that under this cooperation it would be the duty of the State Departments in most cases to assume responsibility in regard to insect pests and diseases, and by inference the timeliness of spray schedules from the residue standpoint. He felt sure, for instance, that these agencies in the Pacific Northwest would function very effectively in the present instance. The Bureau probably has a total of 300 to 500 licensed employees in the apple-producing States familiar with almost every shipping point and who were in constant touch with the situation; furthermore, men could be shifted to districts not adequately supplied with men.

The Chairman stated that it had been expected that Dr. C. W. Warburton, Director of Extension Work in the Department, would be present and explain what the extension forces of the Department could

do to aid in putting across to growers the need of more care in spraying operations. In the absence of Dr. Warburton, however, Mr. F. C. Meier explained that through their subject matter specialists at the colleges, as Extension Horticulturists and Entomologists, direct contact could be established with county agents who would be able to aid greatly in the Department's educational program. Mr. Meier added that already meetings of the extension forces had been held, planning their season's work and attention had been given to excessive spraying with arsenicals. He felt that the extension forces would cooperate in a very effective manner.

Mr. Campbell at this point summarized the discussion, pointing out that the message to be brought to the orchardists would be through the various bureaus of the Department who have representatives in apple-producing fields, through the extension service, and he had no doubt of the full cooperation of the State Agricultural Colleges and Experiment Stations. He felt that there could be brought home to every important apple-producing section of the country the emphatic message that more care must be exercised in spraying; also he felt that the fruit-growing industry itself could bring this message to the growers better than all combined forces of the States and the Department. At this time Mr. Campbell appointed two committees to draw up definite recommendations and plans for the educational campaign contemplated for 1926. As representing the apple-growing industry in its various phases, the following committee was named:

Mr. R. G. Phillips, Secretary, International Apple Shippers' Association.

Mr. A. H. Kent, Grasselli Chemical Co.

Mr. W. M. Dickson, General Chemical Co.

Dr. O. F. Hedonberg, Toledo Rex Spray Co.

Mr. O. T. Clawson, Wenatchee Valley Traffic Association

Mr. A. H. McIntyre, Skinner Machinery Co.

As a committee to formulate the Department's program the following was appointed:

Dr. A. L. Quaintance, Bureau of Entomology

Dr. P. B. Dunbar, Bureau of Chemistry.

Mr. Lloyd Tenny, Bureau of Agricultural Economics.

At this point the conference was thrown open for a general discussion of the subject. Mr. Campfield, of Virginia, pointed out that most of the previous discussion had reference to northwestern boxed apples and desired to know what warnings, if any, should go to Virginia growers and also whether objection had been made in the past, from the spray residue standpoint, to Virginia fruit. Mr. Campfield also desired to know what inquiry if any had been made by the Bureau of Chemistry as to arsenic in apple by-products. Mr. Phillips explained that in one instance some Virginia Albemarle had been found objectionable to British authorities when delivered to the market and were reshipped. He did not have record of all Virginia shipments and consequently was unable to say whether some Vir-

ginia apples had been objected to by the British Ministry of Health. Some York Imperials examined had proven to be satisfactory. While some apples from Virginia showed a considerable amount of spray residue, yet in some instances where analyses had been made this was found to be largely Bordeaux mixture. Dr. Dunbar stated that the Bureau of Chemistry analyses had not shown excessive arsenic on Virginia apples; that a few lots had been just a little below the British tolerance, and that some Virginia apples had shown a rather high Bordeaux residue. The Chairman pointed out that the situation in regard to spray residue itself had been so serious that the Department's attention had been confined to this phase of the matter thus far without entering the byproduct field. Mr. Clawson queried whether there is any uniformity in the making of analyses as to the amount of arsenicals on apples, since the analyses of chemists in the Northwest have not agreed in all cases with those made in Washington, D. C. Dr. Dunbar explained that the methods used in making arsenical determinations in the Bureau's laboratory at Seattle were the same as those employed by chemists in Washington. There was much variation in the amount of arsenic present on apples of the same lot and varying on samples taken at different times.

Mr. Rodgers described what the California State Department of Agriculture and the University of California are doing to keep growers informed on proper spray practice. He stated that in the Watsonville district the general program is to make a calyx spray and foliage spray two to three weeks later. He called attention to the necessity of giving consideration to spraying lettuce and celery. Mr. Hebert felt that representatives of the trade in the Yakima district could go to the growers personally and convey the message much more emphatically than could be done by other agencies, especially emphasizing the commercial value of their industry and the necessity for eliminating any practice prejudicial to it. He stated that already millions of dollars had been lost to the Northwest, due to the situation in the United Kingdom. Mr. Hebert also emphasized the desirability of working without publicity.

Mr. Hearty also expressed his opposition to any publicity and thought that so far as the 1926 crop is concerned the program suggested by Dr. Quaintance should obviate any danger from spray residues.

Mr. Clawson felt that Mr. Hebert had covered the situation in the Wenatchee district exactly. He pledged the growers to adhere 100% to any reasonable program. He explained his own experience in banding and spraying with most satisfactory results from the spray residue standpoint. He felt that while wipers to remove the arsenic from the surface of the apples could be utilized, it would be most difficult to remove arsenate of lead from the stem end of the apples.

Dr. Headlee stated that the spray residue situation in New Jersey had been largely taken care of. He believed their operations met with approval of the Bureau of Chemistry. The New Jersey growers

were fully alive to the necessity of spraying in a way to obviate spray residues and some of the most important growers had already adopted the plan of thorough early spraying to eliminate the first brood of the codling moth. He pointed out that New Jersey is a small state and that close contacts are maintained through the college and experiment station with the growers. He felt the need, however, of some law enforcement organization and gave the suggestion of an English citizen that apples for export be inspected and stamped as being free from anything deleterious to human health.

At this point the meeting adjourned until 2:30 P.M. The session was resumed promptly at 2:30 P.M. with Mr. Campbell in the chair.

Mr. Phillips, on behalf of his committee, presented the following resolution:

RESOLUTION.

This conference called by the United States Department of Agriculture, and composed of growers, shippers, distributors and exporters of apples, insecticide manufacturers, grading and wiping machine manufacturers and State Department officials, fully recognize the crisis that confronts the apple industry in both foreign and domestic markets, both now and for the future as a result of arsenical spray deposits, or residue, or other poisonous deposits.

We appreciate the helpfulness and sympathy of the Department of Agriculture and recognize the avenues and agencies which it has for research and education.

We further appreciate that this conference, representative of the producing, packing, shipping, distributing and insecticide industries not only has its own great responsibilities and interests, but also its educational channels and facilities.

We also are unalterably opposed to newspaper, magazine, press, radio, or other similar publicity in solving this problem which confronts us, or as educational agencies, believing that the situation and its remedy can be presented more effectively and with less damage to the industry by personal work and direct contact.

Therefore, be it resolved:

First, that we thank the Department of Agriculture for its consideration, sympathy and helpfulness.

Second, that we pledge ourselves to cooperate with the Department of Agriculture and each other in supporting such remedial program as the Department of Agriculture may suggest.

Third, that we request the Department of Agriculture to utilize its educational agencies and facilities in placing the situation and its remedies before producers and other interested parties.

Fourth, that we pledge ourselves to do all that we can to meet the problem before us and to avoid further cause for complaint, either at home or abroad.

Fifth, that no publicity through the press, magazines, radio, or in similar manner be given to this conference, or its deliberations, and that the various educational campaigns undertaken may be conducted without newspaper, magazine or similar publicity, and that the Department of Agriculture request its representatives and agencies to observe this principle.

Respectfully submitted,

R. G. Phillips, Secretary,
International Apple Shippers Assn.,
Chairman.

A. H. Kent, Grasselli Chemical Co.

W. M. Dickson, General Chemical Co.

Dr. O. F. Hedenburg, Toledo Rex Spray Co.

O. T. Clawson, Wenatchee Valley Traffic
Association.

A. H. McIntyre, Skinner Machine Co.

Mr. French made reference to H.R. 6241 which passed the House April 7 and is now before the Senate in regard to certificates of inspection for export fruit. Mr. French felt this was a desirable provision and would greatly stabilize the fruit export business of this country. Mr. Campbell explained at some length the purposes of this Bill and its relation to the work of the Federal Horticultural Board. It was not felt that the provisions of this bill could materially affect the arsenical spray residue situation at the present time.

Dr. Quaintance presented the report of the Department's Committee as follows:

EDUCATIONAL PROGRAM OF DEPARTMENT OF AGRICULTURE FOR SECURING THE
ADOPTION OF SAFE AND EFFECTIVE SPRAY PRACTICE BY ORCHARDISTS.

The Committee feels that all Department agencies that are concerned directly or indirectly with the production and marketing of fruits should be utilized in this educational work. These agencies include:

1. In the Bureau of Entomology effective contacts with orchardists can be made through the Bureau's laboratories in fruit producing regions, such as the laboratory at Yakima, Washington; Bentonville, Arkansas; Wichita, Kansas; and Vincennes, Indiana.

Through experiment station and State entomologists additional contacts can be made and spray practice materially affected in the States in question. Emphasis will be placed on securing the adoption by orchardists of spray schedules best calculated to secure control of the codling moth without danger of spray residues at harvest. This will involve concentrated effort in the control of the first brood of the insect to eliminate the necessity of late spray applications. The Bureau also plans extensive experimental work in orchards to ascertain possibilities of improvement of spray practice and also to determine by thorough-going investigations the best methods of controlling the codling moth in orchards.

2. In the Bureau of Agricultural Economics, through the contacts of the Bureau with State Enforcement Bureaus of Departments, the importance of conducting the spray operations in accordance with the recommendations of the Bureau of Entomology will be emphasized on account of the difficulties involved otherwise in the marketing of the products. The Bureau, through its own employees and through licensed inspectors, will be available for local and district meetings to lay before the producers facts concerning the difficulties encountered, particularly abroad. At the time of harvesting and shipping when the inspection work is under way, the Bureau will be glad to cooperate to the limit of its ability and, in line with suggestions from producers and shippers, to utilize the inspection force in whatever way this seems practical and advisable. The foreign offices of the Bureau will be available for conducting any investigations abroad at any time that may be desired.

3. The Bureau of Chemistry has laboratory stations engaged in enforcing the Federal Food and Drugs Act at Seattle, Washington; San Francisco, California; and Denver, Colorado, as well as at various points in the East and Middle West contiguous to fruit producing areas. The Bureau will cooperate with the agencies just named in bringing to the attention of the growers the necessity for using proper precautions in the application of sprays and at the harvesting season and subsequent thereto, will make as frequent and thorough inspections as is possible with the force available to determine whether fruit moving within the jurisdiction of the Food and Drugs Act is safe and free from objection by reason of excessive spray residues. Where fruit containing dangerous quantities of spray residues is found moving in interstate commerce, seizure actions will be inaugurated. In carrying out this program, the Bureau of Chemistry will enlist the aid of the various State authorities enforcing State food laws.

4. It is the idea of the Committee that all other educational agencies within the Department should be utilized. This refers par-

ticularly to extension workers and the Committee feels that the county agents in the different counties that are important fruit producing counties should be advised by the extension agencies in Washington and in the various states regarding the need for care in spraying with the idea that such county agents in their contacts with producers should get the message across wherever possible.

While this Committee cannot speak for the State agencies, it feels that every State educational agency should be interested in this program of work and be encouraged to carry on the educational work to the limit of its ability. The State extension service, wherever it is available and extension specialists in horticulture and entomology should be utilized. It does not feel that an undue amount of general publicity should be given to this educational work and recognizes that the several States in the various communities interested can accomplish the most by personal work with the individual growers, both in the way of public meetings and private conferences.

The Committee is now considering the formulation of some form of circular of suggestions regarding spray practices which can be prepared in mimeographed form and made available for distribution to growers individually either by growers' organizations or by Departmental agencies in the field. It is the idea of the Committee that this circular should deal with the importance of proper spraying methods and the need of conducting the spraying operations in such a way as to reduce to a minimum the spray residues rather than covering in too great detail the question of spray calendars as this matter can well be left up to the technical people interested.

Respectfully submitted,

(Signed) A. L. Quaintance
P. B. Dunbar
Lloyd S. Tenny

(The Circular in question forms an appendix to this report).

After the presentation of this report the conference adjourned at 3:30 P. M.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
Washington, D. C.

Deciduous Fruit Insect Investigations.

April 19, 1926.

CLOSE IN ON THE CODLING MOTH,
THE TWENTY-FIVE MILLION DOLLAR BANDIT.

Fruit growers in many sections of the country face a critical situation in the necessity of better control of the codling moth in profitable apple and pear production. It is firmly believed that this situation can be met if orchardists will seriously devote themselves to the problem and carry out their spraying operations in harmony with the latest advice of the Department, the Agricultural Experiment Stations, State Extension Services, County Agents, etc. The Department, in cooperation with the State agencies mentioned, fruit trade organizations, the insecticide industry and others, is anxious to assist in every way possible in a campaign of more effective and safer spraying for the codling moth. It is obviously impracticable to give detailed advice as to the dates of applications for the various regions involved, yet certain principles which have wide application can be cited, and the Bureau of Entomology would emphasize the observance of the following as highly important.

Adopt as a principle in codling moth spraying the waging of an intensive fight against the first brood of larvae by any and all means, as better and more timely spraying, scraping and banding trees, screening sheds, etc., which will assist in the elimination of the second and later broods and the necessity for late spray applications. For every first brood larva killed, there will probably be 10 less larvae of the second and 100 less larvae of the third brood. "Clean up the first brood and there will not be any second brood."

Spraying Operations: While spraying is the most important method of controlling the codling moth, there are other very important control measures which should not be neglected. When 90% of the petals have fallen, start promptly the calyx spray. This is much the most important of all applications and failure to apply it, or imperfect work at this time cannot be corrected by later treatments. The tops of trees are as a rule insufficiently sprayed. Use a tower on the spray tank with spray rods and angle nozzles to cover the higher parts of the trees. Direct the spray downwards into the apple clusters, whether working from the tower or the ground. If the work for any reason has not been thoroughly satisfactory, make a supplemental calyx spray crosswise to the first application, completing the work within the ten-day period before the calyx lobes close. If a fungicide has been included in the first treatment, it should be omitted if this suggested second spraying is given."

Apply two or three cover sprays for the first brood according to region. Make the first application as first eggs are about to hatch; the second just before hatching of the maximum numbers of eggs, and give the third treatment if the egg laying period is extended by irregular emergence of moths, cool weather, etc. In general these cover sprays should go on at about two weeks intervals. The first cover spray for second brood larvae can usually be given to winter varieties of apples except in regions where experience has shown this is likely to result in spray residue on harvested fruit. Early and fall varieties of apples cannot safely receive the number of applications given winter varieties. In general arsenical spray applications should cease 2 to 2½ months before the harvesting of any variety.

Scraping and Banding Trees: All rough bark under which the larvae can spin their cocoons should be scraped from the trunks and limbs of trees, and bands of burlap tied around these, which will collect some 30 or 40% of the larvae. If these bands are properly used from year to year, their employment will aid materially in keeping reduced the codling moth population in the orchard. In sections where some larvae pupate at or in the soil at the base of the trees, burlap bands placed around the base of the tree will collect these and reduce an important source of reinfestation.

Packing Houses: Very large numbers of codling moth larvae pass the winter in packing houses, orchard sheds, etc., where fruit is received from orchards for grading and packing. Special attention therefore should be given to packing house sanitation. All windows and doors should be screened in the spring to prevent the escape of moths; where practicable cracks and crevices should be eliminated from the floors and side walls of houses by the use of tight flooring. This is especially desirable for rooms in which lug boxes and baskets of fruit are received from the orchard for temporary storage. The larvae leaving the fruit, being unable to escape, can readily be trapped in burlap or other refuse placed for the purpose in the corners and along the sides of the room.

Orchard Sanitation: Orchardists should adopt all measures that will directly aid in destroying the codling moth, or which will interfere with its welfare in the orchard. Piles of cull fruit should not be allowed to accumulate, but should be destroyed if possible daily. In thinning, search out especially the wormy fruit and destroy it.

REMEMBER.

1. That much the best work in control of the codling moth can be done against the first brood.
2. To employ a tower on the spray tank, and spray rods with angle nozzles in order to reach the tops of the trees. This is especially important in the calyx application.

3. To spray inside as well as outside the trees.
4. To use, especially in the calyx application, from $1/3$ to $1/2$ more spray than is customarily applied.
5. To have sufficient spraying machinery, in good repair, to thoroughly do the work, allowing for usual interruptions from bad weather, etc.
6. That arsenate of lead should be used at the rate of 2 to 4 pounds (powdered) per 100 gallons of water or fungicide. Stickers or spreaders should be used for the first brood only.
7. That where late fungicidal applications are necessary, the arsenical should be omitted.
8. To consult your Agricultural Experiment Station, Extension Service, and County Agent in reference to spray schedule and other details.

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